

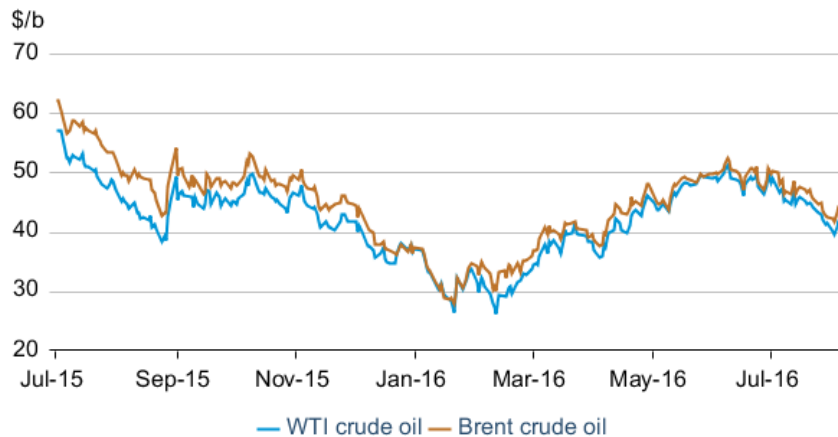


Short-Term Energy Outlook Market Prices and Uncertainty Report

Crude Oil

Prices: Crude oil prices broke below \$45/b and out of a two-month-long trading range in July. The front-month Brent crude oil price decreased \$6.06 per barrel (b) since July 1, settling at \$44.29/b on August 4 (**Figure 1**). The West Texas Intermediate (WTI) crude oil price settled at \$41.93/b, declining \$7.06/b over the same time.

Figure 1. Historical crude oil front-month futures prices



Crude oil production outages, which removed more than 3.7 million barrels per day (b/d) of production in May, declined and brought global unplanned supply outages to 2.4 million b/d in July. The returning production contributed to initial estimates that global inventory built in July, a month where stocks typically show a seasonal decline. Continued increases in U.S. rig counts may add new supply and [reduce the pace of declines](#) in the coming months, likely limiting upward pressure on prices. Although petroleum product demand has been robust this summer, elevated inventories and high refinery production likely brought an early peak to refinery runs. Several refiners announced the possibility of reductions in utilization in the coming months for economic reasons, which could reduce refiner demand for crude oil this fall.

This is a regular monthly companion to the EIA *Short-Term Energy Outlook*

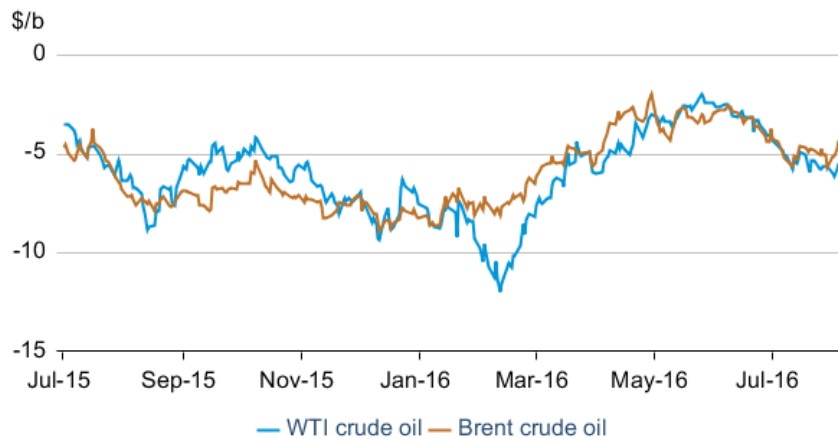
(<http://www.eia.gov/forecasts/steo/>)

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Longer-dated domestic prices did not fall as much as those in the front of the futures price curve, contributing to a wider contango (when near-term prices are lower compared with further-dated ones). The WTI 1st-13th spread declined \$1.15/b since July 1, settling at -\$5.47/b on August 4 (**Figure 2**). Crude oil inventories in [Petroleum Administration for Defense District \(PADD\) 3](#) plus [Cushing, Oklahoma](#), declined 3.9 million barrels from June to July, significantly less than the five-year average decline of 7.7 million barrels, likely providing more downward pressure to the front of the WTI futures curve. The shape of the Brent futures curve was relatively unchanged, with the 1st-13th spread declining by 1 cent per barrel to settle at -\$4.30/b on August 4.

Figure 2. Crude oil front-month - 13th month futures price spread

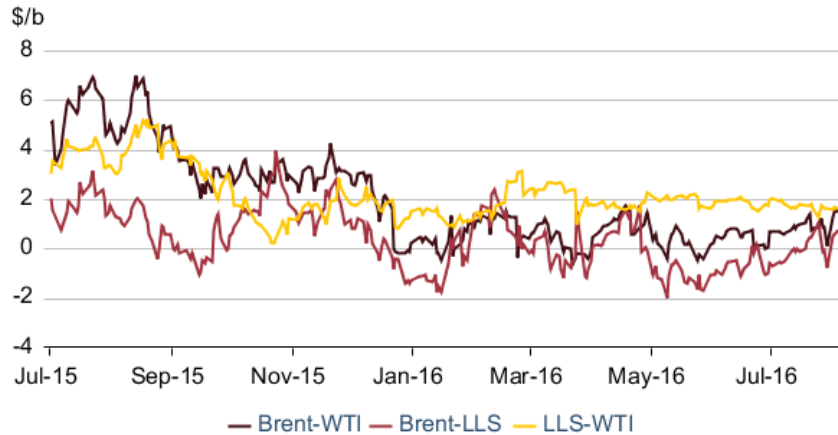


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Lower stock draws in the United States as well as strikes from workers on North Sea platforms could be contributing to higher price premiums for Brent compared with U.S. crudes. Brent flipped from selling at a discount to Light Louisiana Sweet (LLS) to a premium, increasing \$1.45/b from July 1 to settle at 76 cents/b on August 4. The Brent-WTI spread increased by 90 cents/b over the same time to settle at \$1.60/b on August 4 (**Figure 3**). PADD 3 crude oil imports for the four weeks ending July 29, 2016 were [493,000 b/d higher than July 2015](#), suggesting low Brent-LLS and Brent-WTI spreads in May and June improved the economics of importing crude oil. Recent increases in Brent prices could reduce waterborne imports in the coming weeks.

Higher imports in July may have also affected price differentials for U.S. crudes. Decreases in the LLS-WTI spread, which fell 45 cents/b since July 1, suggest the Louisiana market is well-supplied by imports and increasing Gulf of Mexico production—up 100,000 b/d year-over-year. Continued decreases in the LLS-WTI spread could lower deliveries from Houston to Louisiana on the Zydeco pipeline, which delivers onshore-produced crude into St. James, Louisiana, where LLS is priced.

Figure 3. Historical crude oil differentials



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Brent and emerging market currencies: The average value of emerging market currencies was positively correlated with Brent crude oil prices over the past year, but began to diverge recently. Brent prices declined by 11% from June 1 to August 4, whereas the Morgan Stanley Capital International (MSCI) Emerging Market Currency Index increased by 4%, closing at its highest level in over a year (**Figure 4**). The MSCI Emerging Market Currency Index tracks a basket of emerging market currencies' exchange rates against the U.S. dollar. A higher value of the index indicates that emerging market currencies, such as the Chinese yuan, South Korean won, and Taiwanese New Taiwan dollar, are strengthening against the U.S. dollar. This is consistent with recent leading economic indicators, such as in China, where manufacturing activity as measured by the Purchasing Managers' Index (PMI)—with a reading below 50 indicating contraction—expanded in July, the first time since February 2015. Taiwan's PMI increased for the second consecutive month with a reading of 51. Oil prices declining while emerging market growth expectations are improving indicate supply-side factors were the largest drivers of oil price declines, and that prices could have declined further had demand-side expectations not increased.

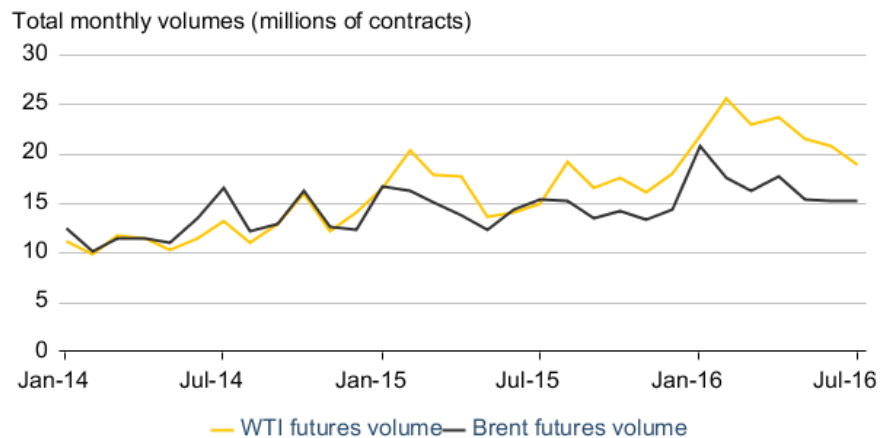
Figure 4. Crude oil and emerging market currency index



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Trading volume: Brent and WTI trading volume reached their lowest levels of the year in July, trading 15.2 and 18.8 million contracts, respectively (**Figure 5**). With the exception of summer 2014, when potential supply disruptions elevated volatility and contributed to increased crude oil trading, trading volumes in the summer months tend to be lower than in the other months of the year. Some producers schedule annual hedging programs in the fall and traders returning from summer vacations may lead to an increase in trading in the coming months. Higher trading volume means more buyers and sellers conducting transactions and contributing information towards price discovery. This increased activity has the potential to move oil prices higher or lower in the fall.

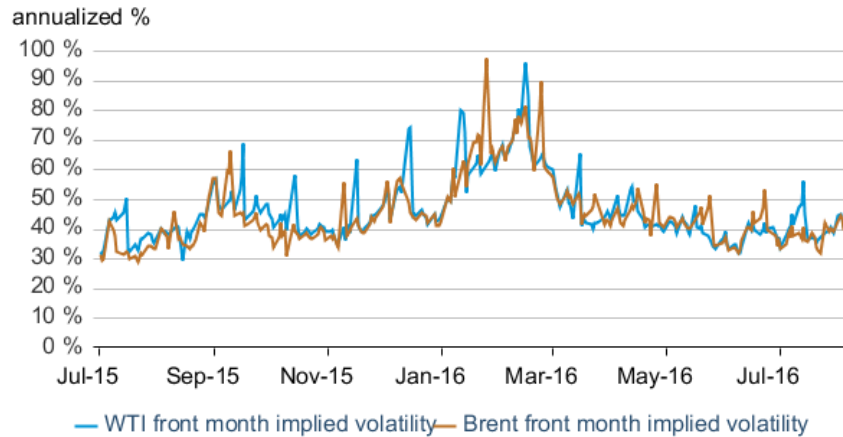
Figure 5. Trading volume for WTI and Brent Futures Contracts



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Volatility: Implied volatility increased month-over-month for the first time since January. Brent implied volatility increased 6.4 percentage points since July 1, settling at 40% on August 4, with WTI increasing 6.8 percentage points over the same time, settling at 40% (Figure 6). In contrast to January, when volatility increased from poor economic data and lowered growth expectations, the increases over the past month appear more related to unseasonable inventory builds and supply returning to the market sooner than expected.

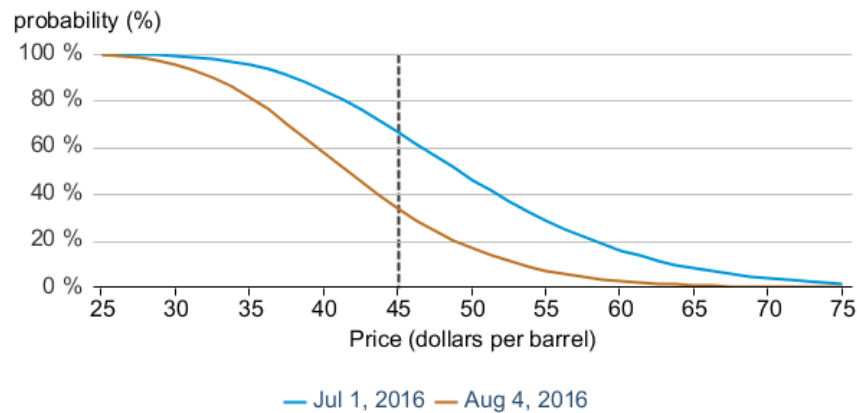
Figure 6. Crude oil implied volatility



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Market-Derived Probabilities: The November 2016 WTI futures contract averaged \$42.33/b for the five trading days ending August 4 and has a 34% probability of exceeding \$45/b at expiration. The same contract for the five trading days ending July 1 had a 67% probability of exceeding \$45/b (Figure 7).

Figure 7. Probability of the November 2016 WTI contract expiring above price levels



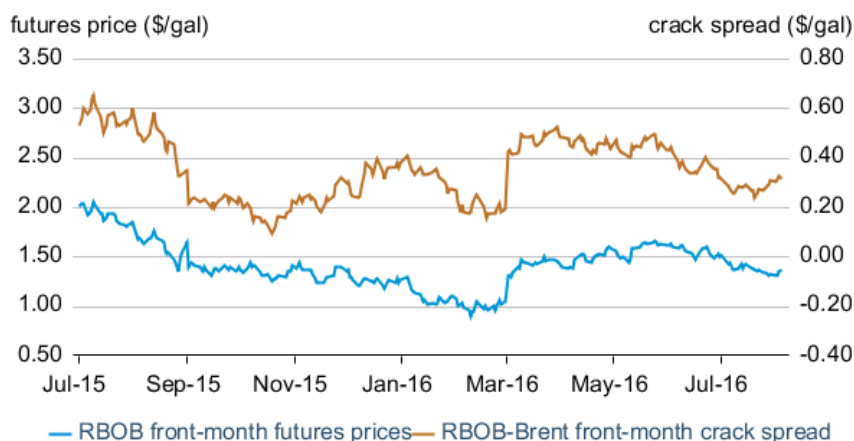
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Petroleum Products

Gasoline prices: The front-month futures price of reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline used in many parts of the country) declined 15 cents per gallon (gal) from July 1 to August 4, settling at \$1.37/gal (Figure 8). The RBOB-Brent crack spread was stable at 31 cents/gal.

In July, the RBOB futures curve showed a slight contango as the August contract traded at a discount to the September contract despite being in the peak gasoline consumption season. Gasoline consumption plus exports in July reached another record of 10.2 million b/d. With continued high gasoline production, however, [total motor gasoline inventories](#) remain 16 million barrels above the five-year high and are pressuring near-term gasoline prices lower. With the peak in U.S. gasoline consumption having likely already occurred, gasoline prices and crack spreads may decline in the next couple of months, with the amount of refinery maintenance this fall a potential source for price volatility.

Figure 8. Historical RBOB futures prices and crack spread



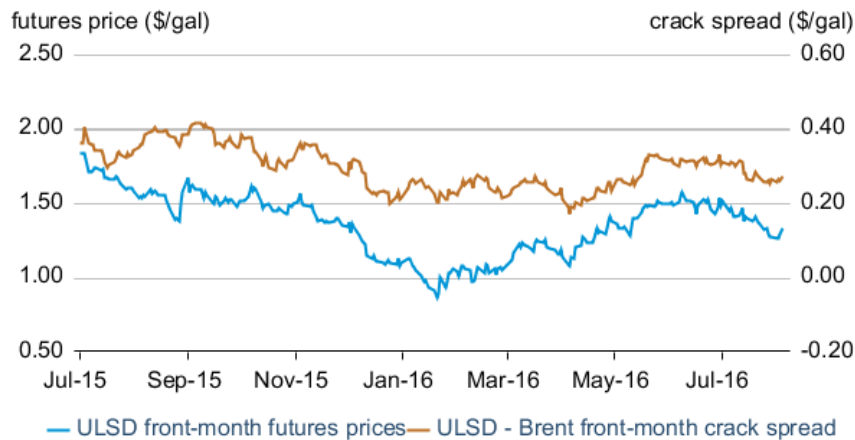
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Ultra-low Sulfur Diesel Prices: The front-month futures price for the New York Harbor Ultra-low Sulfur Diesel (ULSD) contract declined 19 cents/gal from July 1 to settle at \$1.33/gal on August 4 (Figure 9). The ULSD-Brent crack spread declined 4 cent/gal over the same period to settle at 27 cents/gal.

The distillate market weakened in July as the average ULSD crack spread dropped after two straight months of rising margins. Distillate consumption plus exports, which had generally recovered close to last year's levels, declined 0.1 million b/d from June to July, more than double the average decline over the past five years. In July, total U.S.

[distillate stocks](#) rose for the first time since February by 3 million barrels. With declining heating oil and RBOB crack spreads, overall U.S. refinery margins in July were at their weakest for that time of year since 2010. The 3:2:1 crack spread was 27 cents/gal compared with 39 cents/gal over the past five years.

Figure 9. Historical ULSD futures price and crack spread

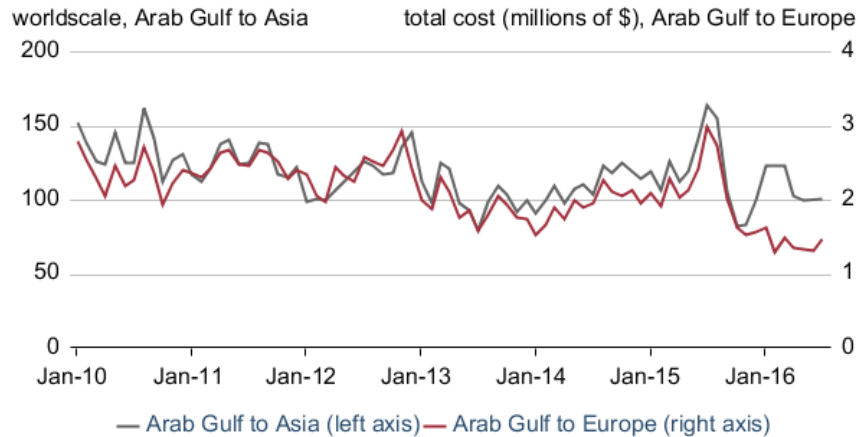


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Clean tanker rates: Clean tanker rates from the Arab Gulf, which is viewed as an indicator of overall clean tanker rates, are lower than in previous years. For much of 2016, the total cost to ship petroleum products on a [Long Range 1](#) (LR1) tanker from the Arab Gulf to Europe has been the lowest since at least 2007 (**Figure 10**). The LR1 clean tanker rate from the Arab Gulf to Asia in July 2016 was at Worldscale 100, representing no deviation from standard flat rates for that route, compared with [last year at this time](#) when the route was at Worldscale 164, or 64% higher than a standard flat rate.

Petroleum product inventories remain at elevated levels in major storage hubs in Europe and Asia, which have pushed product prices lower and narrowed regional price spreads. Because demand for tankers are affected by arbitrage opportunities between different markets, lower overall product prices and smaller spreads between locations around the world makes trade between regions less economically viable and can dampen tanker rates.

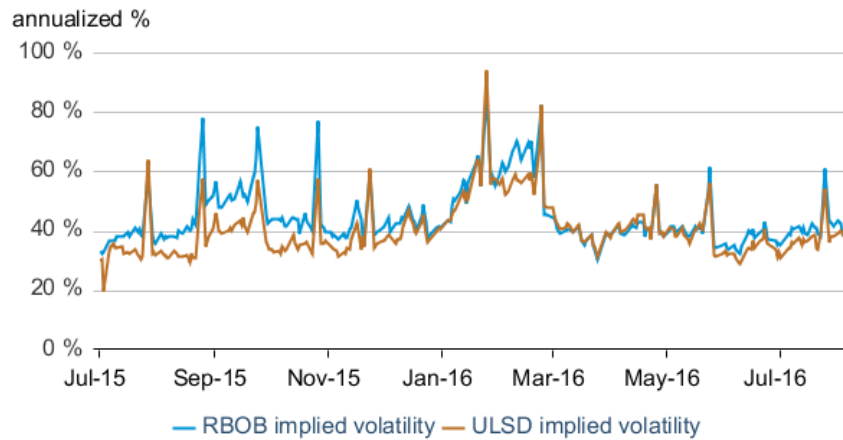
Figure 10. Clean tanker rates, Arab Gulf origin



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Volatility: The implied volatility for the front-month RBOB and ULSD futures contracts increased by 5.1 and 7.2 percentage points to 40% and 38%, respectively, from July 1 to August 4 (**Figure 11**). The increase in implied volatilities for RBOB and ULSD in July were similar to the increase in the crude oil implied volatility. Because of sustained, high global petroleum product inventories, there is increased uncertainty in both the crude and product markets about future price movements.

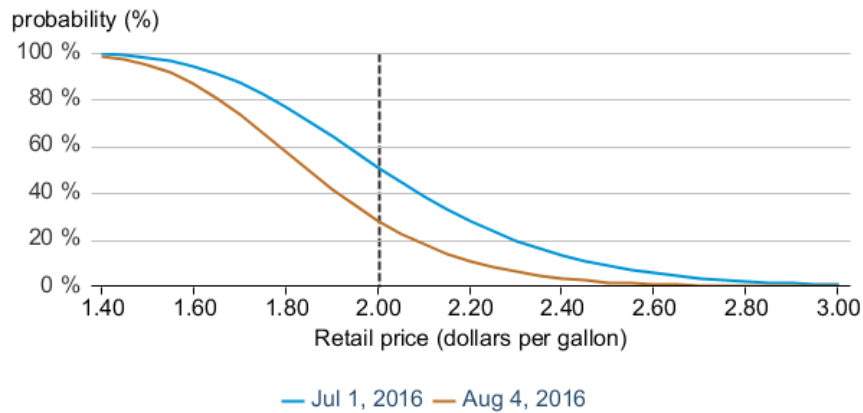
Figure 11. RBOB and ULSD implied volatility



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Market-Derived Probabilities: The November 2016 RBOB futures contract averaged \$1.22/gal for the five trading days ending August 4 and has a 28% probability of exceeding \$1.35/gal (typically leading to a retail price of \$2.00/gal) at expiration. The same contract for the five trading days ending July 1 had a 51% probability of exceeding \$1.35/gal (**Figure 12**).

Figure 12. Probability of November 2016 retail gasoline exceeding different price levels at expiration

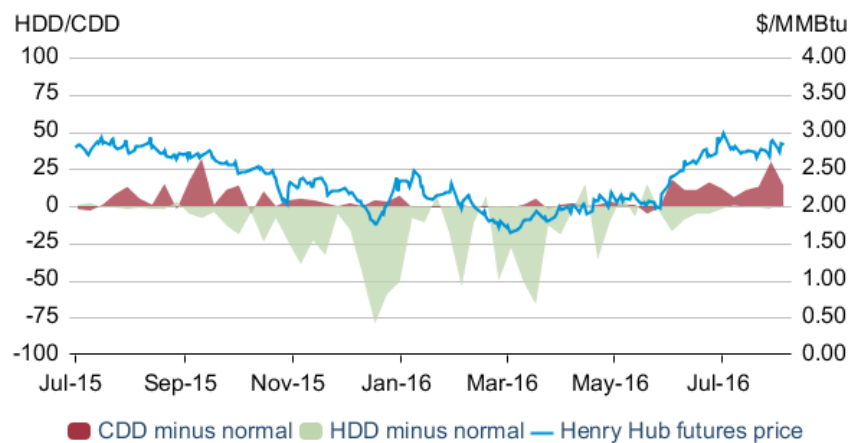


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Natural Gas

Prices: Natural gas prices remained at higher levels in July compared with earlier this year and the front month contract for delivery at Henry Hub settled at \$2.83 per million British thermal units (MMBtu) on August 4 (**Figure 13**). Continued warm weather increased overall demand for electricity, with total electricity generation is expected to be 1.5% higher in third quarter 2016 compared to the July STEO forecast. The overall increase in electricity generation helps to reduce competition between natural gas and coal, acting as the main driver for elevating natural gas prices from early spring lows. Cooling degree days (CDD) were more than 25 days above the 5-year average for the week ending July 29, marking the largest deviation from normal so far this summer.

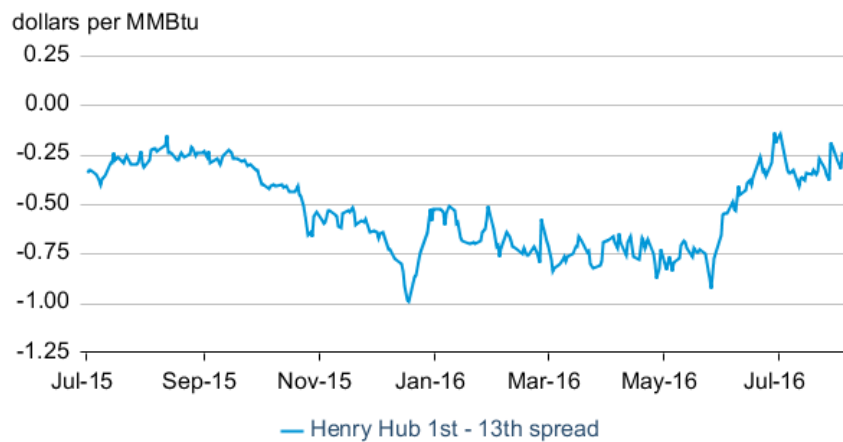
Figure 13. HDD minus normal and CDD minus normal



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The pace of inventory builds for U.S. working natural gas storage is lower compared to the five-year average and is affecting the shape of the natural gas futures curve. The price discount of the front month contract to prices for delivery of natural gas one year out settled at 26 cents/MMBtu on August 4, representing a decline in contango of 58 cents/MMBtu compared with May 2 (**Figure 14**). Over the same time, working natural gas inventories built by an average of 51 bcf per week, compared to an average build of 78.6 bcf per week over the previous five years. While natural gas inventories are still expected to approach all-time highs before the winter heating season, market concerns over reaching storage capacity limits have abated and reduced discounts of near-term prices.

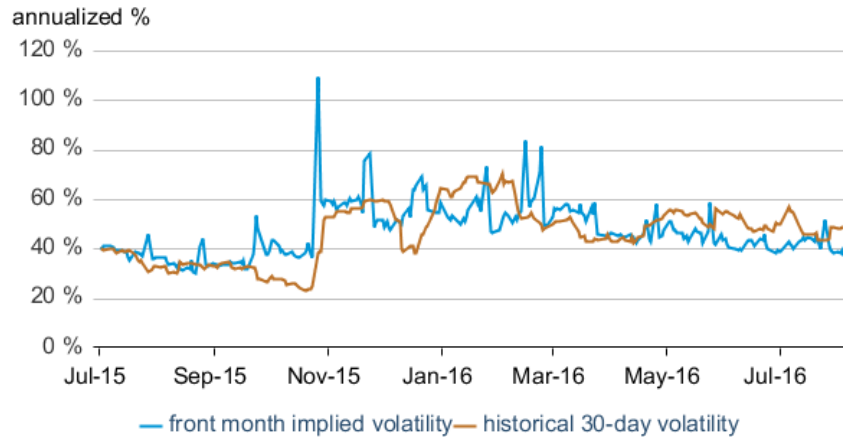
Figure 14. Natural gas 1st-13th futures price spread



eia CME Group

Volatility: Natural gas implied volatility was relatively stable over the past month, settling at 37% on August 4 (**Figure 15**). Historical volatility dropped by 1.6 percentage points since July 1 to settle at 48% on August 4. Higher temperatures and increased electricity generation are helping to move natural gas inventories closer to historical averages and likely reducing price volatility.

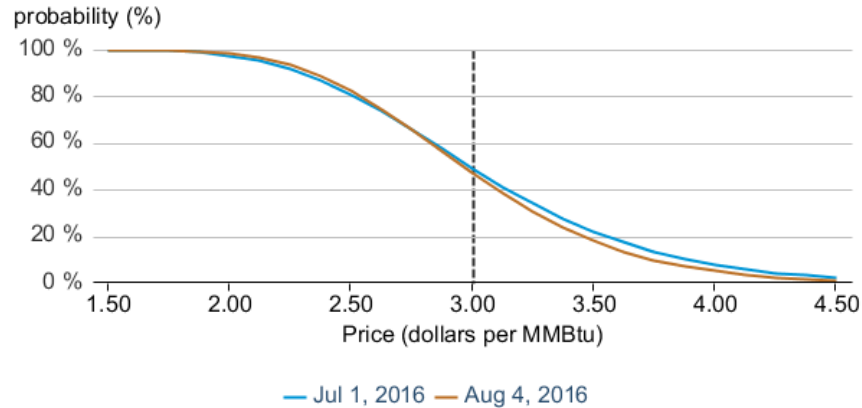
Figure 15. Natural gas historical and implied volatility



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Market-Derived Probabilities: The November 2016 Henry Hub futures contract averaged \$3.01/MMBtu for the five trading days ending August 4 and has a 47% probability of exceeding \$3.00/MMBtu at expiration. The same contract for the five trading days ending July 1 had a 49% probability of exceeding \$3.00/MMBtu (**Figure 16**).

Figure 16. Probability of the November 2016 Henry Hub contract expiring above price levels



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